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ABSTRACT

This report describes Project CREEK (Community Resources Through Environmental Education for Kids), a collaborative 3-year project between the University of California at Davis, the University of Maryland, and a large, rural K-5 elementary school in central California, and a sister site near Baltimore. Specifically, this report examines changes in five fifth-grade classrooms during the first project year resulting from implementation of a technology-enhanced, integrated curriculum. The research team, which included graduate students and university faculty, documented project planning and implementation by means of audio and videotape of integrated lessons, teacher and whole-team meetings, and student focus groups and interviews. The development and implementation of an integrated curriculum was significant in that the five 5th-grade teachers were able to build upon personal and student interests and knowledge, as well as community resources. For example, teachers worked together to develop extensive units on the local watershed, including field trips and weaving using local creek vegetation. In addition, the project allowed for increased communication between the five teachers and between teachers and researchers through electronic computer lists. Interviews revealed that students overwhelmingly preferred CREEK units to the usual content-area teaching, but did not identify the science-based CREEK activities as science, and therefore reported few changes in their attitudes toward science. An important component of the project was community involvement, without which many activities would not have been possible. As part of the project, 130 fifth-grade students visited the computer lab at the University of California at Davis. During 2-hour sessions, students were introduced to the Internet and were led on guided explorations of Web sites. A technology survey indicated that students demonstrated increased motivation to time spent on task and exhibited positive attitudes toward the use of technology. (LP)

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Abstract

Year one of a three year university-school collaboration involving a community based, technology enhanced, integrated curriculum will be examined from the perspective of reform. The genesis of the reform effort as a collaboration, and how, why and to what extent this succeeded will be discussed in light of the rural and community nature of the effort. Some of the elements in the collaboration and reform which will be analyzed include teacher beliefs, communication, planning, teams, leadership, reciprocity, the community, and expertise. Discussion will focus on the community as facilitating and promoting the reform effort. A review of year one will be offered as well as a research agenda for year two.

Genesis of the Reform Effort

The purpose of this paper is to give an overview of an elementary/middle school-university collaborative effort with a focus on school reform. The effort is referred to as Project CREEK: Community Resources Through Environmental Education for Kids--a collaborative project between the University of Maryland, University of California, Davis and a large, rural, K-5 school in central California, and a sister site near Baltimore. The community in which the school is located is relatively small, agricultural, working class and forty percent Latino. Two-way immersion as well as bilingual classes are offered to students in grades K-4. Fifth grade is predominantly a transition year for Spanish speaking students.

The purpose of the researchers is to investigate the changes occurring in upper elementary/middle school classrooms as a result of the collaborative development and

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implementation of a technology-enhanced, interdisciplinary curriculum. The curricular themes center around locally relevant environmental issues and community resources, in particalar the local watershed and creek. The project aims to forge partnerships among teachers, university education faculty, graduate education students, teacher preparation students, and local communities in order to fully explore the impact of the CREEK curriculum. Student centered goals include: To learn to make informed decisions about the community and local environmental issues, and to understand the role of individuals and communities in this process.

The teacher team includes a cohort of all five fifth grade teachers at the California site and another fifth grade teacher at the sister site. Teacher centered goals include:

- To learn about the local creek and generate a related realistic and usable curriculum with corresponding authentic assessments.
- To value student interests, needs and their everyday concepts (with special attention to those interests, needs, and everyday concepts of minority students).
- To understand how to use technology to maximize learning and maximize efficiency.
- To develop trust and team building.
- To link daily practices and information on the teaching/ learning process with relevant educational research.

The research team includes three graduate students and four university faculty from three institutions whose interests and expertise include science, math, language and literacy, social sciences, and environmental education. Each researcher has his/her own detailed agenda and goals, but all can be subsumed under the following:

- To explore the role of multiple technologies in instruction and learning.
- To explore how integrated education is developed and implemented.
- To explore the role of environment issues in learning and instruction.
- To explore the role of integration in the literacy of second language learners.
- To explore the perception and development of science, reading, math, social studies and the environment in integrated, technology enhanced learning and instruction.

Missing from this list is any mention of researchers and teachers working together to develop curriculum, team teach, or other forms of close collaboration or sharing of intellectual resources. The research design is one of no treatment or intervention from the research team to the teachers or schools. Rather, the role of the researchers on the project is to fully document and disseminate findings from the evolution of a technology enhanced, community-based, integrated curriculum and to facilitate only as requested by the teacher team. The research team was adamant about the need for teacher autonomy and the role of the researchers being to document the process and evolution of the reform work by the teachers. This "hands-off" design, like all research designs, comes with its share of limitations and frustrations. Taken to its extreme, even casually chatting with teachers could be considered an intervention, depending upon the content and context of the conversation. It was important to the research team to learn from the teachers and not attempt to impose some sort of transmission or other top down model (especially considering the inefficacy of this approach). Reciprocity, giving back from the researchers to the teachers, comes in the forms of information sharing and facilitation by way of providing financial, informational and community resources as requested and in so far as possible. For example, the research team has provided through grant money beginning, middle and end of year conferences for the entire team, retreats for teachers to plan and build curriculum, release time for teachers, technical expertise and information,

for example, in-service workshops on riparian ecosystems. In the beginning, the role of grant money and technical expertise helped build motivation for teachers to be interested in the project. This is a legitimate and understandable position for the teachers who did not already have a close association with most of the researchers. However, after a year and despite numerous changes in the teacher team and to a lesser extent the researcher team, the relationships have strengthened and a shared purpose and commitment characterize the mutuality of the teams' efforts.

Accounting For Success

The research team documented all of the planning and implementation of the project by means of audio and videotape of integrated lessons, teacher and whole team meetings, retreats and conferences as well as teacher reflections and student focus groups, interviews and work products. In addition, ethnographic field notes were taken throughout the year in the fifth grade classrooms.

A year one retrospective reveals how, why and to what extent the collaborative reform effort could be considered successful in terms of its community and rural nature. It also reveals limitations and constraints. The fifth grade teacher team was approached by one of the lead researchers because of the degree to which they were already working as a team and their exemplary commitment to the school, the students, the community and one another. This is a significant factor in the successes of the curriculum reform. However, becoming involved in the research effort both forced and allowed this grade level collaboration to intensify.

The Teacher Team:

- *Expertise, Leadership & Planning*

During year one teachers chose to do two intensive integrated units, each lasting two weeks. During these units the grade level teachers worked as specialists, each

developing an area of interest and expertise, and lessons consistent with the aligned grade level expectations/existing frameworks and the objectives of curriculum reform effort, project CREEK. Students then rotated through the five classroom stations, spending two days at each station. In this way teachers adjusted and perfected the lessons and activities as they learned what worked and what could be improved. Students came to know and experience all five fifth grade teachers and vice versa. Data reveal that both teachers and students came to see the entire grade level as one unit, rather than as individuals belonging to one particular class.

The evolution and implementation of the integrated curriculum is significant in that teachers were able to build upon interest, knowledge and resources available to them and develop units accordingly--for example, elaborate, extensive units on the local watershed, including trips to the creek and dam as well as basket making and weaving using local creek vegetation, guided by the teachings of the indigenous peoples of the region. In this way teachers allowed themselves autonomy and choices, but with the support of colleagues. Allowing teachers to build on their own interests and expertise seemed critical to the success of the curriculum reform effort because it made the seemingly huge undertaking more manageable and inherently interesting to those doing the curriculum development. Again, an organic, bottom up reform model appears effective.

There was no designated leader among the teachers, although, one teacher, more than the others seemed to be allowed the final decision in the case of differences of opinion. However, this same teacher advocated strongly for the team at the school, with the administration and in the community, including the local school board and was highly respected by teachers and parents. Year two, which has just begun at the time of this paper will prove interesting as this teacher has moved to another school district and a different teacher, the only male in the group, who is heavily involved in the local community, appears to have taken up the unofficial leadership of the team. In fact, of the original team of five teachers at the California site only two remain going into year two.

Incredibly however, the newer teachers are committed to the CREEK project, possibly because it was presented to them as a quid pro quo of employment at that grade level and because they attended the end of year one research conference with the combined teams of teachers and researchers as well as a year two planning retreat for teachers. Those teachers that have moved to other schools have expressed a desire to remain involoved in some way.

Year one teachers choose to work as a team, as is evidenced by their occasional Friday after school get togethers and their before school breakfasts, which serve both social and work purposes. They also arrange to share duties and responsibilities in large and small ways--for example, to take one another's "time out" or makeup work students and to make extra copies for the entire grade level when needed, rather than for their own classes only. They also see themselves as a cohesive group and present themselves to others, including parents and the community in that way. On "back to school night" the fifth grade teachers first met parents as a group, discussing shared goals, objectives, and philosophies, rather than as separate classes, as is the norm. They held a fifth grade potluck dinner in January of the year, the purpose of which was to inform parents about key events that had taken place, including Project CREEK and to further enlist their support for upcoming events.

- *Communication*

Clearly, these teachers have a commitment to communicating with one another. The research project made this communication more accessible through setting up two electronic lists--one for teachers only and one for teachers and researchers. Teachers have agreed among themselves to read and respond to the messages on their list before school each morning. Researchers too have their own list, not accessible to teachers. Of course, individual teachers and researchers can and do email one another

directly as well, in order to share information. The acknowledgment and provision for both in-group and across group communication has allowed teachers and researchers to communicate comfortably, effectively and efficiently. To date there have been no reports of being "burdened" by too many messages or enslaved to the technology in any way. One important caveat--this type of electronic communication requires that someone has the expertise and willingness to set up and teach if necessary this technology, and although minimal, it does require a commitment on the part of those involved to maintain such a system. Interestingly, there are those on both teams that fall all along the spectrum from very many to very few technical skills; but all have benefited from the ability to communicate electronically with colleagues.

- *Teacher Beliefs and Characteristics*

Teachers agreed to the project because of a desire to grow professionally and offer students an even more enriched schooling experience. They were committed to the three basic tenets of the project--technology enhanced, community-based, integrated learning. They also share an ability-centered perspective in terms of student potential and learning. The implications and consequences of this view of students are deep and numerous. Basically, teachers don't anticipate failure or disappointment by students and hence don't experience such. How this empowerment perspective is realized happens on a moment by moment basis in and out of the classroom. Teachers trust students and have high expectations of them; otherwise they would not take them to potentially dangerous places like the dam or the creek, to art museums or professional offices, as was the case during CREEK.

Integration of Subject Matter

During CREEK units teachers adopted a project approach to teaching and learning where there was an integration of subject matter across disciplines, allowing for deeper

understanding and synthesis of concepts. This meant there was less of the usual daily designated math, language or science time. CREEK was all of these things, although different units were more focused on some skills than others. During Project CREEK students studied various units that involved going to the local creek, making animal tracks, gathering and recording data and classifying observations. Other units ranged from learning about light, optics and photography and touring the local dam to understanding Native American uses of creek plants through basket making. Students also did library research and wrote and illustrated the history of the creek using primary and secondary sources. They acted out a play with various "stakeholders" vying for creek resources and making recommendations for its use and management--i.e., farmers, fishermen, environmentalists, the government water resources board, and other community members.

Students were interviewed pre and post CREEK units on their attitudes toward science and what they liked and disliked most about science. Students overwhelmingly preferred CREEK units to the usual designated content area teaching, but interestingly didn't identify the science based CREEK activities as science, and therefore reported few changes in their attitudes toward science. Understandably, the integration blurred the disciplinary boundaries.

The integrated, hands-on, community based curriculum helped to contextualize concepts and language for all students and benefited bilingual students in particular through increased context embeddedness in very cognitively demanding activities. It should be noted that the two teachers with the bilingual students encouraged the students to utilize their Spanish proficiency, indeed, encouraging them with "Use Spanish if you can" while developing English proficiency. Bilingualism was esteemed by all fifth grade teachers (themselves bilingual) and seen as an asset, whereas monolingual students are designated in the administrative jargon of the school as "English only".

The success with which CREEK activities occurred and the degree to which the students enjoyed them reflects the strength of teacher beliefs in the benefit of this

curriculum reform. Indeed these teachers believe strongly in an integrated curriculum and worked together to bring their vision to fruition. In addition they used their strong ties to community to further enhance this curriculum. Many props, experiments, field excursions, guest speakers, demonstrations and volunteering went into making these units maximally comprehensible and accessible to all students.

The Community Base

There is a strong sense of collaboration and responsibility instilled in the students by the teachers. This reflects the strong ties that exist in the school and larger community. Indeed many of the activities and units that were planned by the teachers during CREEK weeks would not have been possible except for the involvement and support of many community members. Many of the teachers have other roles in the community and therefore are closely connected to the greater community. The tours that students went on were often made possible by local people. The history of the area that was imparted to the students came from community members. Indeed it seems that the prior existing ties within this community made possible the ways in which these teachers worked as a team and managed to carry out so many different activities relating to the local area. Through enlisting the help of others, teachers strengthened community and administrative support for the project. Among those who helped on field excursions were the superintendent, the principal, the counselor and the resource specialist, as well as many parents. Even the parents of some teachers volunteered!

As mentioned, the science based activities were feasible not only because of parental involvement, but because of non-parent members of the community who were willing to participate. Tables 1 and 2 provide an outline of the various types of activities which served as the basis for the integrated curriculum being taught during each of the two units of instruction. In almost every instance there were community members involved in the instruction and/or guidance of the students through activities including the local dam

tender, the town's optometrist, a local historian, the town librarian, a basket weaver and native history specialist, and many more. These people made it possible to provide the students with an integrated curriculum that was rich with knowledge and experiences that were relevant to them and their community. Relevancy is a key factor in motivating students to learn and to remember what they learn. Indeed many studies have shown shown the positive effect of learning in meaningful, socially organized contexts on student achievement and attitudes, (Bransford, 1983; Sherwood, 1987; Vanderbilt, 1990)

Rural students come from a tradition steeped in community involvement. The type of community involvement found in this particular program has served to reinforce that a sense of community is still very much alive and well in our education system, and plays a major role - particularly in rural schools. In many ways community involvement picks up where the education budget leaves off.

The Use of Technology in a Community-Based, Integrated Curriculum

One component of the curriculum reform was the introduction of the internet to the students. Most students in our study had not had prior experience with computers or the internet. Even those students who did have knowledge of what the internet was did not have access to it very often. This information was revealed in technology surveys given at the beginning of the year. We proposed that a study of the impact of the internet on student attitudes toward technology might provide valuable data on curriculum reform. It was hypothesized that internet access would have a strong impact on students from a rural school, allowing them to interact with environments other than their own. The internet provides students with access to real world, real time experiences and has the ability to incorporate their own enviroment into this experience, (Boone, 1997). Indeed at a conference held for teachers and researchers at the end of the year, the teachers commented on the success of this activity. In a sense the internet has the effect of taking a rural school out of "isolation" and into other communities around the world as well as

fostering cultural literacy (Cummins & Sayers, 1995). An advantage of the internet is the opportunity that it provides students to work in a collaborative environment.

Over the period of five weeks 130 fifth grade children came to the computer lab at University of California at Davis. During a two hour session the students were lead on a guided exploration of web sites. The students first visited a web site from their own region and then looked up their residential address on an interactive map of their home town. Next they conducted their own search for information on a neighboring creek. Working in pairs, the students answered questions on worksheets as they visited the sites. After completing this guided exploration the students were allowed to visit some additional sites and choose from the following options: Bill Nye the Science Guy; Famous Hispanic Painters and the Whitehouse amongst others. Finally before the students left they were shown their own school site where they saw pictures of their teachers and of the "integrated curriculum project" activities. Observation of student behavior was conducted using video camera and field notes. Students also completed an attitude toward technology survey.

Preliminary analysis indicates that students exhibited increased motivation to time spent on task. Possibly this is due to the order in which the web sites were visited. Visiting their own environment first and then progressing to other sites such as the Whitehouse gave the students an idea of how expansive the internet is and how many different types of information are available on the web as well as demonstrating how their "world" is also a part of this. Indeed the highlight of the session was seeing their teachers and school on the big screen in the lab. Seeing this environment as part of this expansive network which contains information about places all over the world was very exciting for them. The technology surveys showed positive attitudes toward using the internet. They also indicated that each student seemed to be interested in one particular section of the exploration over all other parts. One of the main advantages of using the internet in

instruction is the motivational factors of being able to combine real world, real time data with an extensive choice of data that is interesting to individual students.

Regardless of their level of experience with computers, students exhibited few signs of intimidation by the technology. Indeed observations indicate that interaction with the internet tends to further empowered students to want to utilize the technology, regardless of English language proficiency. Interestingly, when something "went wrong" the students attributed this to the technology, to the machines, rather than to their own inexperience or ineptness (more characteristic of adults interacting with technology). These finding are contrary to the belief held by many educators that students with little computer experience will find technology enhanced instruction to be a frustrating experience.

Conclusion:

In one way it is difficult to comment on the success of this curriculum reform as we are only one third way through the three year project. On the other hand, in measuring this success against what the teachers planned and what it means to have an integrated curriculum, it would seem that this was a successful year. The teachers in our study benefited in meeting their reform goals by having time, support and resources of many kinds, and each other. Much of the integration that occurred was more obvious to the researchers than to the teachers themselves., During a conference involving both researchers and teachers at the end of the year, the teachers were astonished at all they had achieved. Understandably, it was difficult for them to look at what was happening and reflect on it while they were planning and implementing it. Another important factor in the success of the effort was the ability of teachers to remain flexible and open to the many changes that inevitably came about, including those involving the team, facilities, administration and students. Despite these changes, teachers managed to support one another while remaining determined to carry out their mission. Continuity has been

maintained to a degree because of the desire by several members of the original team who have moved sites, to stay in touch electronically and physically and even collaborate with the newly formed cohort of teachers. Students too reported a greater sense of community by having the entire fifth grade as their class. Many of the CREEK activities seemed to give students a strong sense of themselves and their local community and how that is a part of the larger world, important considerations for a rural community approaching the 21st century. The community was brought into the school and the school was out in the community in what is appropriate and effective pedagogy. In this way the school and the community have a reciprocal relationship.

The research agenda for year two is different for each researcher, although the overall research goal remains the same. The teachers plan to continue developing the integrated curriculum and implementing it. Technology will play a greater role this coming year than it has before and the research team will continue to document the process and disseminate the findings.

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